

**Performance Standards for the Production
of Certain Meat and Poultry Products
March, 2000**

OBJECTIVES

Upon completion of this module, the student will be able to:

1. List the performance standards for cooked beef, roast beef and cooked corned beef.
2. List the performance standards for fully cooked poultry products and partially cooked poultry breakfast strips.
3. State the lethality performance standard for cooked beef, roast beef and cooked corned beef.
4. State the lethality performance standard for fully cooked poultry products.
5. Identify which organisms are used as indicators of meeting performance standards for lethality and stability.
6. State the stabilization performance standard for cooked beef, roast beef and cooked corned beef.
7. State the stabilization performance standard for fully cooked poultry products and partially cooked poultry breakfast strips.

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Overview

As of March 8, 1999, FSIS converted into performance standards the regulations governing the production of cooked beef, roast beef, and cooked corned beef products, and certain fully and partially cooked poultry products. Unlike the previous command and control requirements for these products, the new performance standards spell out the objective level of food safety performance that establishments must meet. The new performance standards also allow establishments to develop and implement processing procedures customized to the nature and volume of their production. Establishments that do not wish to change their processing practices may continue following the previous requirements for these products, which are in Agency guidance materials.

Establishments operating under HACCP are not required to develop a processing schedule. FSIS expects establishments to develop hazard analyses and HACCP plans that address measures the establishment will take to meet the applicable performance standard. Importantly in such cases, validation would ensure not only that a HACCP plan was functioning as intended, but also that performance standards were being met.

In regard to establishing only food safety objectives, FSIS has determined that clearly defined performance standards and HACCP are both necessary for improving food safety. Performance standards and HACCP provide meat and poultry establishments with the incentive and flexibility to adopt innovative, science-based processing procedures and controls, ensure safety

for consumers, and provide objective, measurable standards, compliance with which can be verified through Agency regulatory oversight.

Ready-to-Eat Products

FSIS now requires that certain ready-to-eat products (cooked/roast beef products and fully cooked poultry products) meet two performance standards: lethality and stabilization.

Lethality

Establishments must treat ready-to-eat product so as to ensure a specific, significant reduction in the number of *Salmonella* microorganisms. This will also eliminate or adequately reduce other vegetative pathogenic microorganisms from the product. There is no requirement that any particular means be used to meet the lethality standard, although for cooked products a heat treatment is necessary. Cooking need not be the sole means by which lethality is achieved. Applicable treatments, such as curing or other controls, might be used in combination with cooking to achieve the required lethality.

The reduction of pathogenic microorganisms is measured in "x-decimal" reductions, where x is a number. In the new regulations, a single "1-decimal" reduction represents an expected 90% reduction in the number of organisms, i.e., the number of organisms would be expected to be reduced by a factor of 10. A "5-decimal" reduction reduces the number of organisms by an expected factor of 10^5 or 100,000.

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In terms of a common logarithm (\log_{10}) scale, an "x-decimal" reduction is the same as saying an "x- \log_{10} " reduction. FSIS refers to this as a "decimal" or "-D" reduction. However, FSIS feels that it is clearer and more descriptive to use the phrase "x- \log_{10} ." Therefore, FSIS describes pathogen reduction values as "x- \log_{10} " reductions rather than "x-decimal" or "-D" reductions. Thus, an "x- \log_{10} " reduction means that the number of organisms are expected to be reduced by a factor of 10^x . In terms of probability distributions, this means that the probability, p , that a given organism will survive an "x- \log_{10} " lethality reduction is $p = (1/10^x)$. More generally, it is assumed that the distribution of the number of surviving organisms given n initial organisms is a binomial distribution with parameters n and p .

For the cooked beef, roast beef, and cooked corned beef products (§318.17), the lethality performance standard is a 6.5- \log_{10} reduction in *Salmonella*. For cooked poultry products (§381.150), it is a 7- \log_{10} reduction. Traditionally, the primary pathogenic microorganism of concern in these cooked products has been *Salmonella*. Furthermore, the thermal destruction of *Salmonella* in cooked beef products would indicate the destruction of most other pathogens.

FSIS noted that though a 6.5- \log_{10} and 7- \log_{10} reduction in *Salmonella* would eliminate or adequately reduce vegetative pathogenic microorganisms from these cooked products, a 6.5- \log_{10} and 7- \log_{10} reduction in *Salmonella* also may be quite conservative in certain processing environments. FSIS also recognized that developments in processing technology might indicate that a safe, ready-to-eat cooked beef or poultry product could be produced with a different level of lethality.

Stabilization

Stabilization means preventing growth of spore-forming bacteria that may produce toxin either in the product or in the human intestine after consumption. If allowed to grow in number, these bacteria can cause food borne illness. Steps or controls applied to products to bring about the lethality of certain pathogenic microorganisms, particularly heat treatment, can create a model environment for the multiplication of spore-forming bacteria. Spores of *Clostridium botulinum*, *Clostridium perfringens*, and other spore-forming bacteria can survive cooking. In fact, they can thrive in the warm product following cooking after competitive microorganisms, such as *Salmonella*, have been eliminated.

FSIS requires that establishments stabilize each of the ready-to-eat products to **prevent** multiplication of toxigenic microorganisms such as *C. botulinum*, and allow **no more than** a 1- \log_{10} multiplication of *C. perfringens*. Limiting the allowable growth of *C. perfringens* to a 1- \log_{10} multiplication would effectively limit the multiplication of other, slower growing spore-forming bacteria, such as *Bacillus cereus*. FSIS anticipates that most establishments meet the stabilization performance standards by rapidly cooling products following cooking.

The compliance guidelines, which are essentially the old cooked beef regulations, contain chilling suggestions to inhibit the growth of spore-forming bacteria. Compliance with these guidelines allows establishments to meet the stabilization performance standard.

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The regulations for cooked poultry products in §381.150, however, did not contain chilling requirements. The chilling recommendations in FSIS Directive 7110.3, "TIME/TEMPERATURE GUIDELINES FOR COOLING HEATED PRODUCTS" are in the compliance guidelines. FSIS determined that the chilling examples in the directive yield cooked poultry products that meet the stabilization performance standard. Most, if not all, establishments already follow this directive.

Safe Handling Labels

According to the updated safe handling regulations (§317.2(l) and §381.125(b)), all meat and meat products of cattle, swine, sheep, goat, horse, and other equine that **do not** meet the requirements contained in §318.17, (and similarly treated poultry and poultry products **not** meeting §381.150) or that have **not** undergone other processing that would render them ready-to-eat, **must** bear safe handling instructions.

The Final Rule

In summary, the substantive changes are:

- The lethality performance standard for all ready-to-eat cooked beef, roast beef, and cooked corned beef, is a 6.5-log₁₀ reduction in *Salmonella*. For fully cooked poultry, it is a 7-log₁₀ reduction.
- The lethality performance standards now clarify establishment responsibility not only for reducing *Salmonella*, but also for the reduction of other pathogens and their toxins or toxic metabolites necessary to prevent adulteration of the product.

- The lethality performance standards now explicitly provide for the optional use of a combination of controlled, intermediate steps to achieve the required lethality of ready-to-eat products.
- Establishments will not be required to hold and test product.
- The rule allows meat and poultry establishments to employ processing methods other than those previously mandated, as long as those methods yield products that meet the performance standards set forth in the rule.
- The compliance guidelines for fully cooked poultry contain chilling requirements currently contained in FSIS Directive 7110.3, since previously there were no regulatory chilling requirements for the poultry products covered under §381.150.

§318.17 Requirements for the production of cooked beef, roast beef, and cooked corned beef products

(a) Cooked beef, roast beef, and cooked corned beef products must be produced using processes ensuring that the products meet the following performance standards:

(1) Lethality.

A 6.5-log₁₀ reduction of *Salmonella* or an alternative lethality that achieves an equivalent probability that no viable *Salmonella* organisms remain in the finished product, as well as the reduction of other pathogens and their toxins or toxic metabolites necessary to

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prevent adulteration, must be demonstrated to be achieved throughout the product. The lethality process must include a cooking step. Controlled intermediate steps applied to raw product may form part of the basis for the equivalency.

(2) Stabilization.

There can be no multiplication of toxigenic microorganisms such as *Clostridium botulinum*, and no more than $1 - \log_{10}$ multiplication of *Clostridium perfringens* within the product.

Partially Cooked Poultry Breakfast Strips

Unlike the fully cooked, ready-to-eat products described above, partially cooked poultry breakfast strips are essentially raw, and require adequate cooking prior to consumption. FSIS does not have a lethality performance standard for partially cooked products, since they are not ready-to-eat. However, FSIS requires that establishments producing these products meet a stabilization performance standard identical to the stabilization standard for fully cooked products.

During processing, these products are partially cooked and then cooled, which creates a model environment for the growth of *Clostridium perfringens*, *Clostridium botulinum*, and other spore-forming, toxigenic bacteria. If such toxigenic bacteria were to multiply, cooking by the consumer, retailer, or other end-user may **not** eliminate these bacteria from the products. Therefore, it is important that bacterial growth be controlled in these products to the

extent possible while they remain at the producing establishment.

As with fully cooked poultry chilling, these products also need to be quickly chilled. The compliance guidelines give suggestions for chilling. When applied, these chilling requirements produce partially cooked poultry breakfast strips that meet the stabilization performance standard.

FSIS still requires partially cooked poultry breakfast strips to be labeled with cooking directions. It is imperative that consumers thoroughly cook these products, as they are essentially raw, and may contain viable pathogenic microorganisms.

§381.150 Requirements for the production of fully cooked poultry products and partially cooked poultry breakfast strips

(a) Fully cooked poultry products must be produced using processes ensuring that the products meet the following performance standards:

(1) Lethality.

A $7 - \log_{10}$ reduction of *Salmonella*, or an alternative lethality that achieves an equivalent probability that no viable *Salmonella* organisms remain in the finished product, as well as the reduction of other pathogens and their toxins or toxic metabolites necessary to prevent adulteration, must be demonstrated to be achieved throughout the product. The lethality process must include a cooking step. Controlled intermediate steps applied to raw product may form part of the basis for the equivalency.

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(2) Stabilization.

There can be no multiplication of toxigenic microorganisms such as *Clostridium botulinum*, and no more than a 1-log₁₀ multiplication of *Clostridium perfringens* within the product.

(b) Partially cooked poultry breakfast strips must be produced using processes ensuring that the products meet the stabilization performance standard. Labeling for these products must comply with §381.125. In addition, the statement "Partially Cooked: For Safety, Cook Until Well Done" must appear on the principal display panel in letters no smaller than ½ the size of the largest letter in the product name. Detailed cooking instructions shall be provided on the immediate container of the products.

(d)